

7.1 Wizards

Rapid development of CAPE-OPEN
software components



Wizards developed

▼ **UNIT Operation wizard by AspenTech**

▼ **THRM wizard by Hyprotech**

▼ **In-house wizards**

- ⦿ Are known to exist, for example to create UNIT modules in C++



UNIT Wizard purpose

▼ Make it simpler and faster for an engineer to build a CAPE-OPEN compliant unit operation model using the Microsoft COM version of the interface standards

⇒ Simpler because:

- No need to know as much about COM as an engineer trying to develop a unit operation from scratch would

⇒ Faster because:

- the tool will generate a complete Microsoft Visual Basic project, to which the engineer only needs to add a user interface form, a calculation routine and a validation routine



Scope

- ▼ **The unit operation created is compliant with the interface standards as defined by:**
 - ➲ The 0.93 version of the CAPE-OPEN type library which contains the current interface definitions for unit operations
 - ➲ Common Services standards covering component identification, error handling and parameters

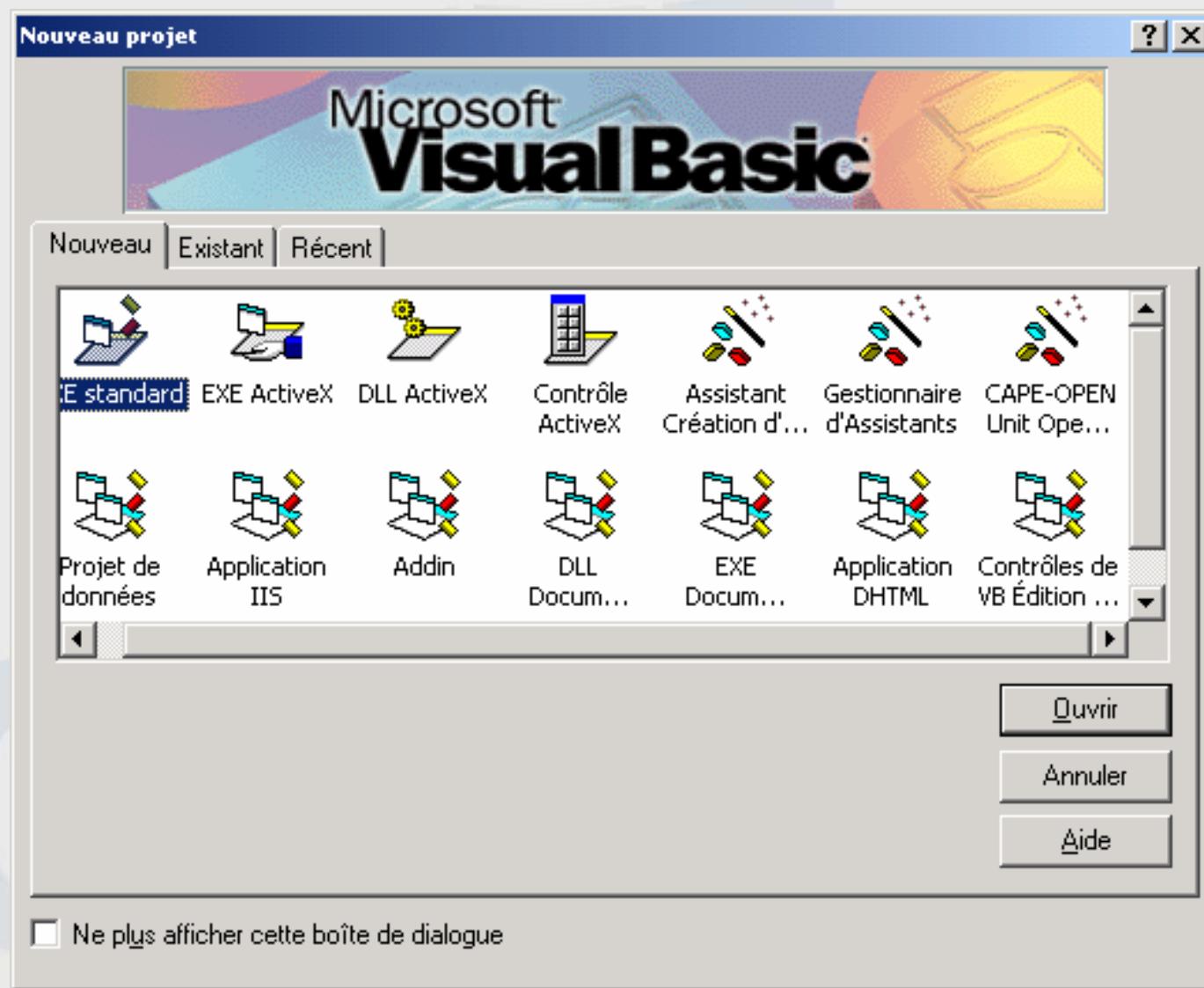


Overview

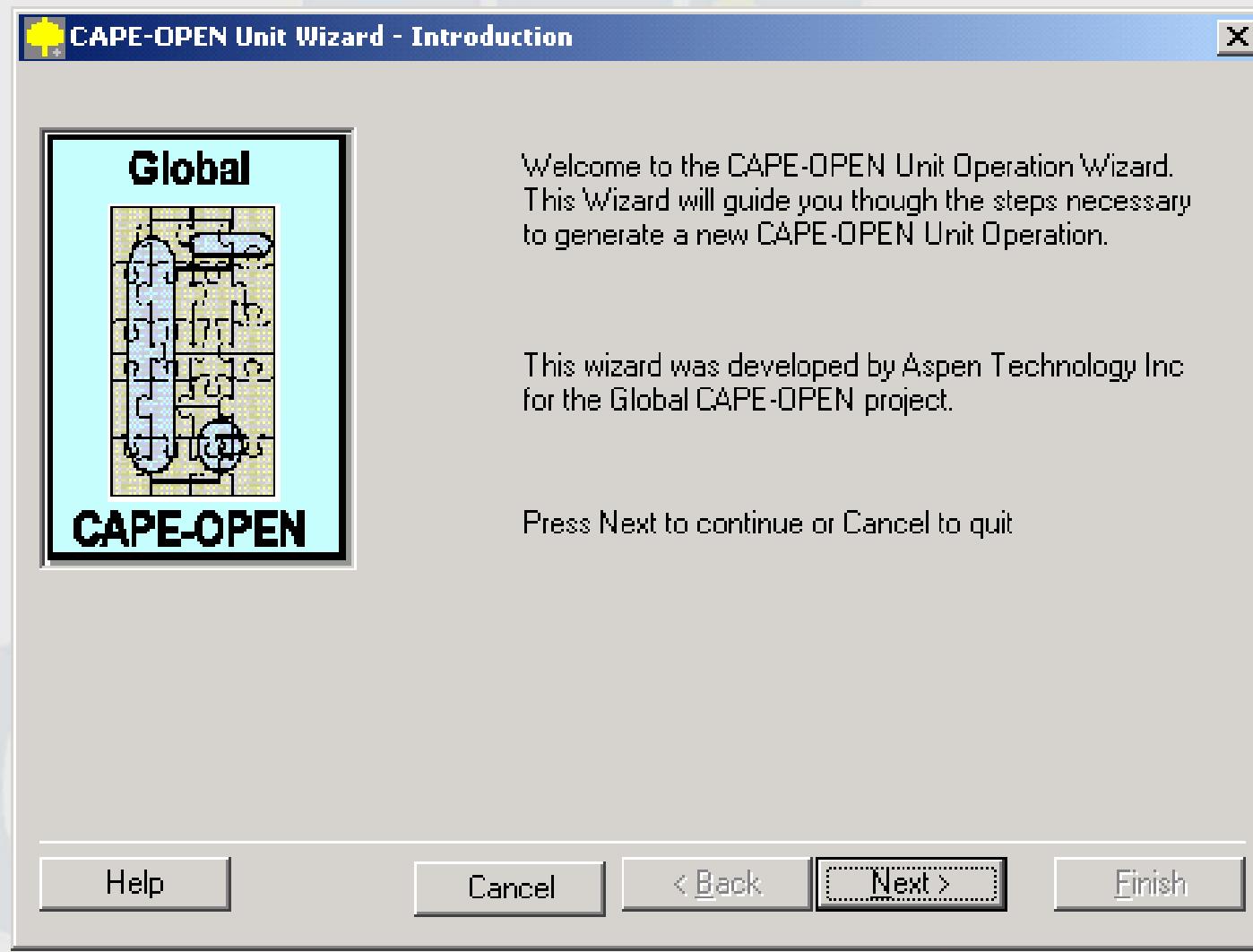
- ▼ **Visual Basic Wizard to generate a new CAPE-OPEN unit operation**
- ▼ **An installation program to install the wizard**
- ▼ **An uninstall program to remove it**
- ▼ **No documentation other than material associated with the screens presented by the wizard**



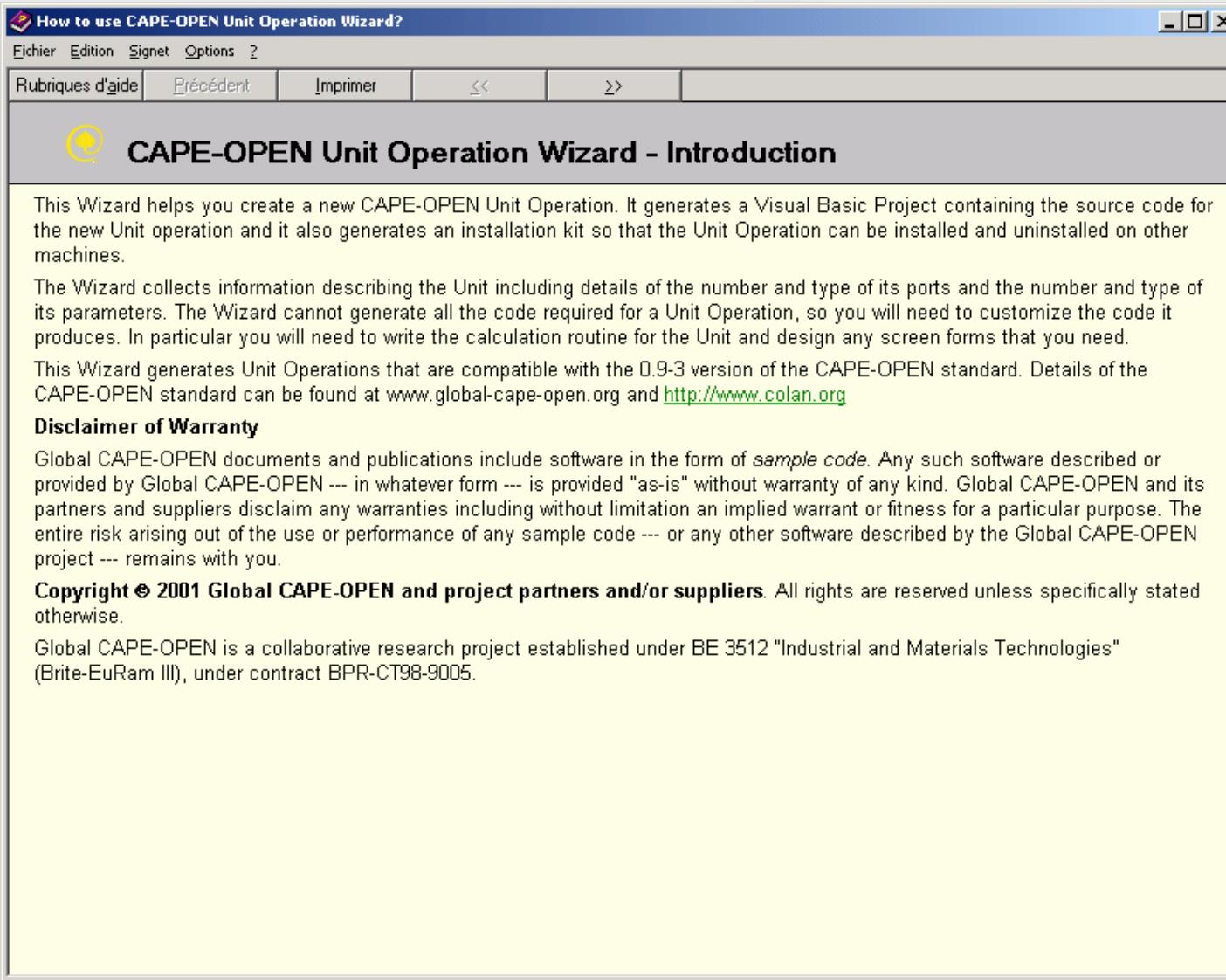
UNIT Wizard within Visual Basic



Developed for Global CAPE-OPEN



Online help available



The screenshot shows a Windows-style help window titled "How to use CAPE-OPEN Unit Operation Wizard?". The menu bar includes "Fichier", "Edition", "Signet", "Options", and a question mark icon. The toolbar below the menu has buttons for "Rubriques d'aide", "Précédent", "Imprimer", and navigation arrows. The main content area features a yellow circular icon with a question mark and the title "CAPE-OPEN Unit Operation Wizard - Introduction". The text explains the purpose of the wizard, its limitations, and compatibility with the standard. It also includes a "Disclaimer of Warranty" and copyright information.

How to use CAPE-OPEN Unit Operation Wizard?

Fichier Edition Signet Options ?

Rubriques d'aide Précédent Imprimer <> >>

CAPE-OPEN Unit Operation Wizard - Introduction

This Wizard helps you create a new CAPE-OPEN Unit Operation. It generates a Visual Basic Project containing the source code for the new Unit operation and it also generates an installation kit so that the Unit Operation can be installed and uninstalled on other machines.

The Wizard collects information describing the Unit including details of the number and type of its ports and the number and type of its parameters. The Wizard cannot generate all the code required for a Unit Operation, so you will need to customize the code it produces. In particular you will need to write the calculation routine for the Unit and design any screen forms that you need.

This Wizard generates Unit Operations that are compatible with the 0.9-3 version of the CAPE-OPEN standard. Details of the CAPE-OPEN standard can be found at www.global-cape-open.org and <http://www.colan.org>

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Steps to be followed

- ▼ Enter General Information on UNIT
- ▼ Provide Parameter list with details
- ▼ Provide Port list with details
- ▼ Generate Visual Basic executable



Entering General Information

 CAPE-OPEN Unit Wizard - General Information X

Unit Operation Name	
Class Name	
Description	
Version	
CAPE-OPEN version	0.9-3
Vendor URL	
About text	
Help URL	

Buttons: Help | Cancel | < Back | Next > | Finish



General information

▼ Unit Operation Name

- ↪ The user must enter a short name that will identify the unit when it is displayed within a simulator – up to 12 characters

▼ Class Name

- ↪ A valid VB name that will be used as the name of the class generated by the wizard

▼ Description

- ↪ The user may enter a description of up to 32 characters which will also appear in the simulator to help identify the unit operation

▼ Version

- ↪ The user may enter a version identification string.
No format is specified but typically a number



General information (cont'd)

▼ CAPE-OPEN version

- ↪ The user may identify the CAPE-OPEN version with which this unit is compatible

▼ Vendor URL

- ↪ The user may provide a URL where information about the provider of the Unit Operation can be found

▼ About text

- ↪ The user can enter free-format text giving information about the component

▼ Help URL

- ↪ The user can provide a URL where help on how to use the unit operation can be found



General information example

CAPE-OPEN Unit Wizard - General Information X

Unit Operation Name	Advanced rate-based distillation model
Class Name	RATESEP
Description	Model for distillation and absorption columns
Version	1.0
CAPE-OPEN version	0.9-3
Vendor URL	www.acme.com
About text	This unit operation model is provided by ACME as an example.
Help URL	www.acme.help.com

Help Cancel < Back Next > Finish



Parameters

▼ Public Unit Parameter:

- ⇒ the means by which a component can make its internal variables visible to another component.

▼ Parameter List (i.e. Parameter Collection):

- ⇒ the collection of Public Unit Parameters that a Unit wishes to expose to the outside world.



Entering a Parameter list

CAPE-OPEN Unit Wizard - Parameter List X

Use this form to define public parameters for your unit operation

Name	Description	Value



Parameter list

▼ Add button to create a new parameter and add it to the list

⇒ Clicking on Add causes the Parameter Details dialog to be displayed. This dialog contains the following data entry fields:

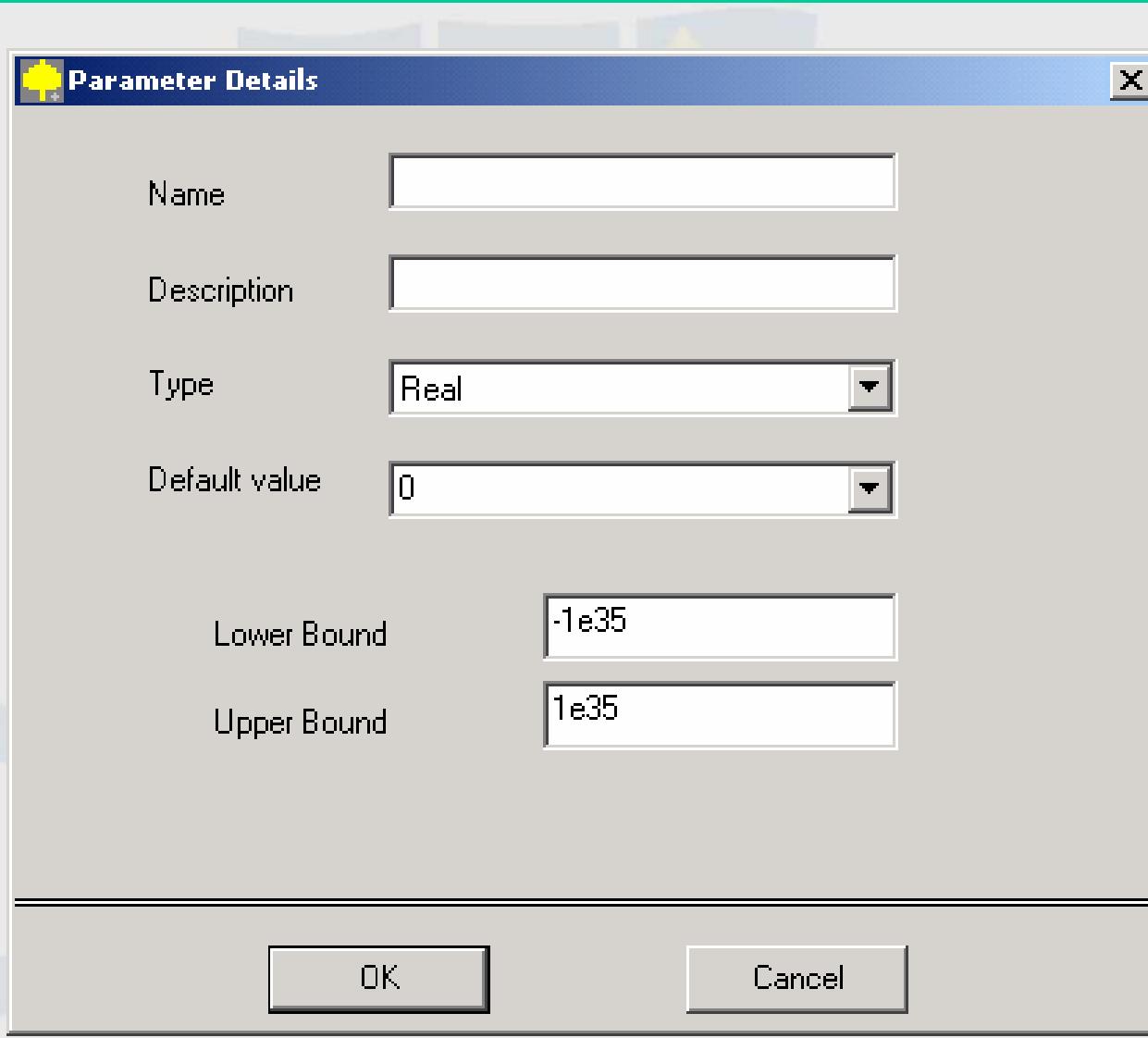
- Name (A short name for the parameter)
- Description (A description)
- Type (A drop-down list: Real, Integer, Option)

⇒ For the Integer and Real types :

- Default Value (Defaults to 0)
- Upper Bound (Defaults to 1E35)
- Lower Bound (Defaults to -1E35)



Entering details on each Parameter

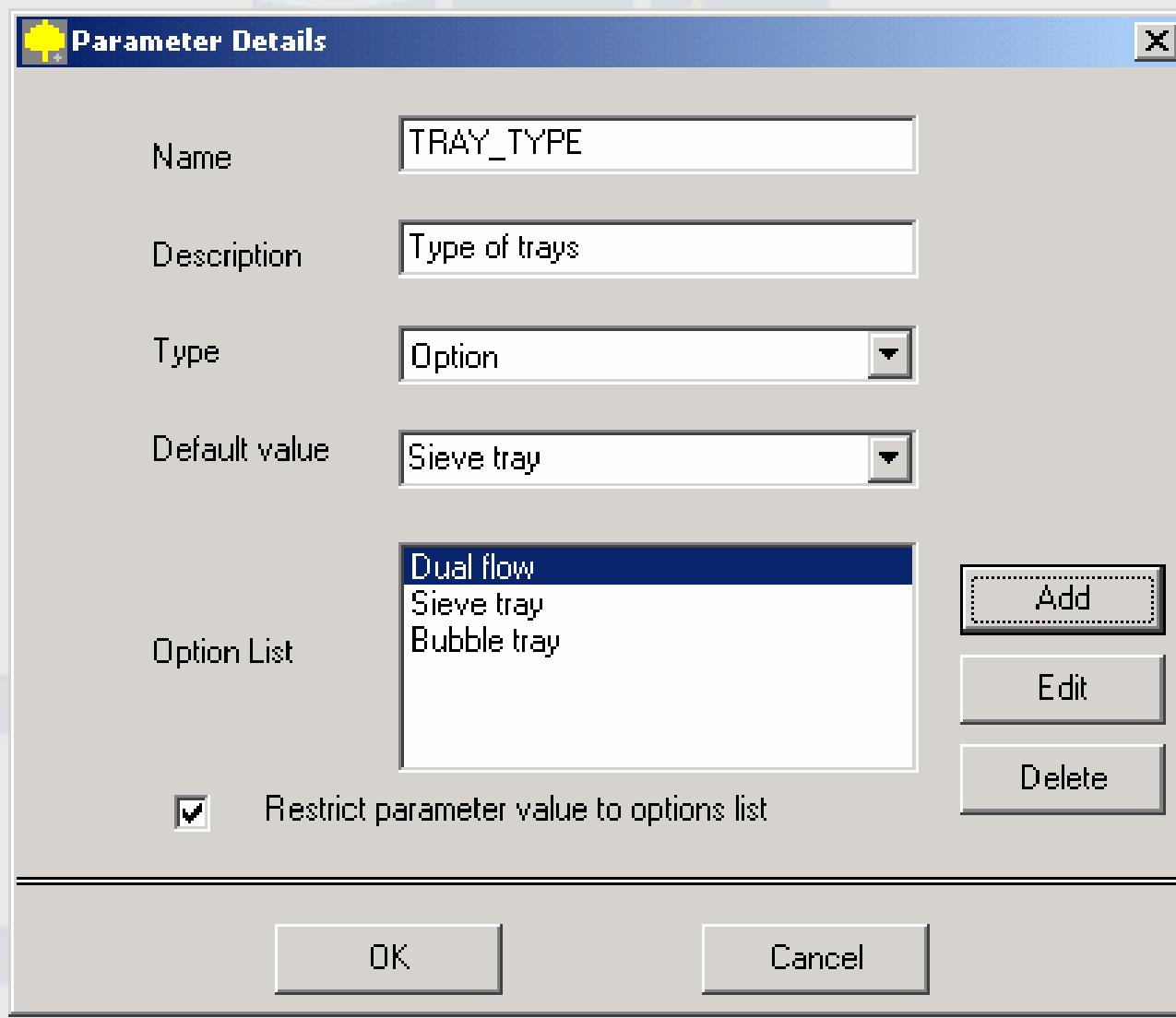


Parameter list

- ▼ Both OK and Cancel return the user to the Parameter list dialog
- ▼ Using the OK button causes the new parameter to be added to the list
- ▼ Use the Delete key to remove a parameter from the list
- ▼ To change the data for a parameter select it and click the Edit key
 - ⇒ Parameter Details dialog is shown and the data for the parameter can be changed



Example of Parameter details



Ports

▼ Port:

- ↪ the means by which a Flowsheet Unit is connected to its streams. Streams are implemented by means of Material Objects.

▼ Port list (i.e. Port Collection):

- ↪ the means by which the Flowsheet Unit groups together its ports.



Entering a Port list

 CAPE-OPEN Unit Wizard - Port List X

Use this form to define inlet and outlet material ports for your unit operation.:

Name	Description	Direction	Port Type

< Back

Next >

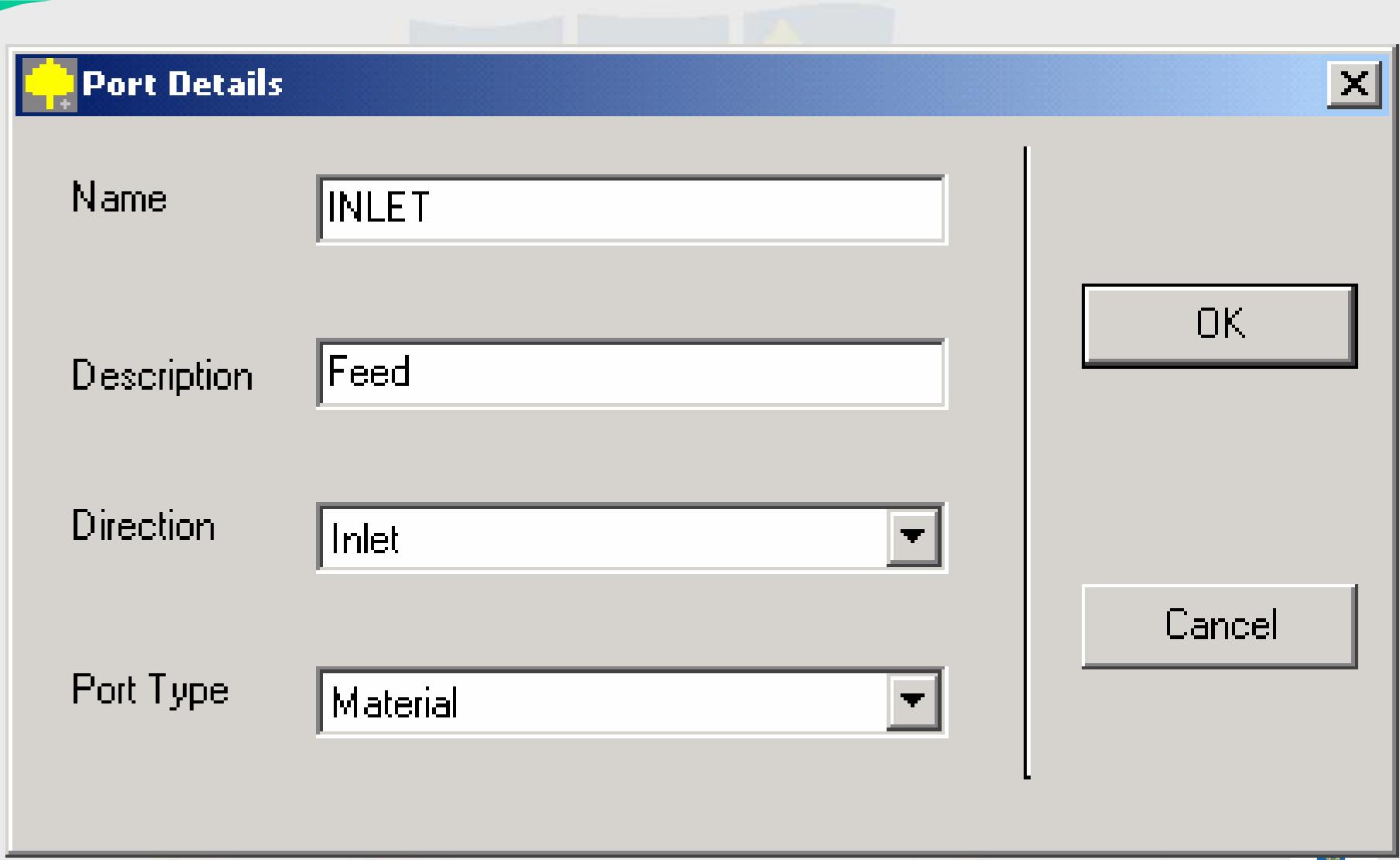


Port list

- ▼ Allows the user to define the ports belonging to the unit
- ▼ Displays a list of ports currently defined and provides Add, Delete and Edit buttons as well as Next, Back and Cancel
- ▼ Using the Add button takes the user to the Port Details dialog where there are the following data entry fields:
 - ⦿ Name (The name of the port)
 - ⦿ Description (A description of the port)
 - ⦿ Direction (Inlet or Outlet as choices)
 - ⦿ Port Type (Material, Information or Energy)



Entering details on a Port



Port list

- ▼ Both OK and Cancel return the user to the Port list dialog
- ▼ Using the OK button causes the new parameter to be added to the list
- ▼ Use the Delete key to remove a parameter from the list
- ▼ To change the data for a port select it and click the Edit key. The Port Details dialog is shown and the data for the parameter can be changed



Example of Port list

 CAPE-OPEN Unit Wizard - Port List X

Use this form to define inlet and outlet material ports for your unit operation.:

Name	Description	Direction	Port Type
INLET	Feed	Inlet	Material
TOP	Outlet stream on top	Outlet	Material
BOTTOM	Outlet stream from bottom	Outlet	Material
SIDE1	Side outlet stream #1	Outlet	Material

Add Delete Edit

Help Cancel < Back Next > Finish



Generating the VB code



What to do next

▼ **Install and test your UNIT operation**
 ⇒ Deploy it within your organization

▼ **Add code for the calculation routine**
 ⇒ calculates outlet conditions and internal parameters given inlet conditions.



Installing the Unit Operation

▼ The CAPE-OPEN Unit Operation Wizard creates an installation kit for your Unit Operation and saves it to a directory called "Installation Kit". Within this directory you will find three files:

<ModelName>.cab
Setup.exe
Setup.lst

- ▼ To install your Unit Operation run Installation Kit\setup.exe.
- ▼ If you need to give the Unit Operation to someone else, they will need all three files and they should run setup.exe on their own machine to install it.



Uninstalling the UNIT operation

- ▼ Use Start>Settings>Control Panel>Add/Remove Programs
- ▼ Look for the entry with the description of the form <VB class name> CAPE-OPEN Unit
- ▼ Double-click this entry to uninstall your Unit Operation.
- ▼ Uninstalling the Unit Operation will not affect your Visual Basic project. You will still be able to work the project and to re-install the Unit Operation at a later time.



Adding code to the Unit Operation project

- ▼ The wizard generates a stub for the Calculation routine in the class file for your unit operation. This file is called <class name>.cls where <class name> is the name you provided for the Unit Operation class on the General Information screen of the Wizard. You will find this class listed under the Class Modules folder in the VB Project Explorer.
- ▼ Open the class and in the Code Window select ICapeUnit in the Object box (the drop down box on the left at the top of the Code window) and then select Calculate in the Procedures/Event box (the drop-down list to the right at the top of the Code window). The Code Window displays then displays the ICapeUnit_Calculate procedure.
- ▼ The code generated by the Wizard simply returns a CAPE-OPEN error. You need to replace this code with the real calculation code. Comments are provided in the routine to show you how to access stream data using the CAPE-OPEN material objects associated with your Unit Operation's ports.
- ▼ If you have asked the Wizard to provide a blank form for the Unit Operation, you will need to add controls to the form to allow an end-user to edit the Unit Operation's data. To edit the GUI form that the Wizard provides, open the Forms folder in the project explorer and double-click on the frm<Class Name> object.



Conclusion

▼ Helps developers get started with new Unit Operations

- ⇒ Creates a Visual Basic Project
- ⇒ Creates an Install/Uninstall program
- ⇒ Developer has to complete:
 - Validate
 - Calculate

▼ AspenTech made the Wizard freely available

▼ Downloadable from CO-LaN website

▼ AspenTech has pledged to maintain the wizard as CAPE-OPEN evolves

- ⇒ e.g add support for generating calls to existing FORTRAN

